

AMENDMENTS TO THE DRAWINGS

The attached "Replacement Sheets" of drawings include changes to Figures 24 and 29. The attached "Replacement Sheets," which include Figure 24 and 29, replace the original sheets including Figures 24 and 29.

Attachment: Replacement Sheets

REMARKS

Claims 1-4, 6-12 and 14-21 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

DRAWINGS

The drawings stand objected to under 37 CFR 1.83(a). Although Applicant does not necessarily agree, Applicant attaches revised drawings for the Examiner's approval. In the "Replacement Sheets" the phrase "reference pulse" is replaced with "pulse generating means". Favorable consideration of this change is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 12 and 14-21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090) and further in view of Fukano (Japanese Pat. No. 63141750). This rejection is respectfully traversed. Notwithstanding, claim 1 is amended to recite the subject matter of claim 5. Inasmuch as claim 5 was not rejected based on the above combination of references, Applicant respectfully submits that amended claim 1 is allowable over these references.

Claims 1, 2, 5, 12, and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Nishihara (U.S. Pat. Pub. No. 2002/014450) and further in view of Fukano (Japanese Pat. No. 63141750). Claim 5 also stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii

et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No. 2002/0018090) and Fukano (Japanese Pat. No. 63141750) and further in view of Ishinaga et al. (U.S. Pat. Pub. No. 2002/0149657). These rejections are respectfully traversed. Applicant respectfully submits that neither Nishihara et al. nor Ishinaga et al. teach or suggest the feature of claim 5 that is now recited in Claim 1.

In particular, Claim 1 calls for “the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period”.

The office action asserts that Nishihara teaches “the ejection failure detecting means detects presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period (Par [0155], [0156]).” (see item 19 of page 8). Applicant respectfully disagrees.

Claim 1 requires the ejection failure detecting means to detect the presence or absence of ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period.

In contrast, the portions of Nishihara et al. pointed out by the Examiner disclose the following:

[0155] The liquid-quantity determining unit 205 includes a counting unit 212 capable of counting the pulses of a residual vibration signal generated by the residual vibration and of measuring a time period necessary for counting a predetermined number of pulses. The counting unit 212 is provided with three counters, i.e., a first counter 300, a second counter 301 and a third counter 302. The counters 300, 301 and 302 start counting the pulses at different starting time

points, respectively. Thus, the pulses are counted three times.

[0156] The liquid-quantity determining unit 205 includes an error detecting device 213. The error detecting device 213 decides that the operation of the counting unit 212 for counting the pulses is defective when the differences between the measured time periods are greater than an allowable limit.

As such, Nishihara et al. does not disclose or teach the claimed feature of the present invention which calls for detecting the presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period. Specifically, in Nishimura a comparison is made between the differences among the three measured periods and an allowable time limit, while in the claimed configuration a comparison is made between a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator and a count value of the counter counted for the predetermined time period. Therefore, Applicant respectfully submits that the claimed subject matter is patentably distinct from Nishimura et al.

Further, the portion of Ishinaga et al. pointed out by the Examiner discloses the following:

[0201] At step SB3, various processes for executing the subsequent recovery operations are performed. For example, the recording head 500 is joined to the capping device; if the recovery process is started during the one line recording, the recording operation is interrupted. Next, at step SB5, the alarm 550 is actuated to inform of the malfunction to the operator. At step SB7, the ejection recovery process is executed to remove the cause or causes of the malfunction.

[0202] Thereafter, at step SB9, the preliminary ejection is performed, and the discrimination is made as to whether the malfunction is cleared or not during this preliminary ejection, at step SB11. If not, the steps SB7-SB11 are repeated. If so, the steps SB13 be executed for termination of the recovery process, for

example, resuming the recording. Then, the recovery process is terminated.

[0203] By this recovery process, occurrence of a cause of the ejection failure or improper ejection can be correctly and quickly detected, so that the alarming and the recovery operation can be properly and quickly made.

As such, it is unclear where (if anywhere) these paragraphs describe the claimed feature of the present invention which calls for detecting the presence or absence of the ejection failure by comparing a normal count range of the reference pulses when a droplet is normally ejected by the driving of the actuator with a count value of the counter counted for the predetermined time period..

Although Applicant agrees that Ishinaga et al. detects ejection failure, in Ishinaga et al., the ejection failure is detected based on the temperature changes shown in Fig. 4 which is detected by the temperature sensors of the substrate 1. For this purpose, in the structure shown in Fig. 3, the output voltage from the sensor 2 is compared with a reference voltage provided by the voltage source 10 by the comparator 9. Further, in the structure shown in Fig. 5, the output B of the differentiator 31 which is connected to the sensor 2 is compared with the reference voltage by the comparator 9. Furthermore, in the structure shown in Fig. 7, the changing rate of the temperature outputted from the A/D converter 34 is used to detect the temperature changes.

Therefore, Applicant respectfully submits that Ishinaga et al. does not disclose or teach the subject matter of claim 1.

For the reasons stated in the above, Applicant respectfully submits that claim 1 is patentable over the cited references.

Claim 6 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), Ishinaga et al. (U.S. Pat. Pub. No. 2002/0149657) and further in view of Kawamura (U.S. Pat. No. 4,577,203). Claim 6 also stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), Ishinaga et al. (U.S. Pat. Pub. No. 2002/0149657) and further in view of Yamaguchi et al. (U.S. Pat. No. 5,379,061). These rejections are respectfully traversed.

Kawamura discloses detecting the presence of air bubbles, but the detection is based on whether or not cavitation occurs by a negative pressure caused just after ejection of droplets. Kawamura does not disclose or suggest that the ejection failure detecting means judges that an air bubble has intruded into the cavity as a cause of the ejection failure as in the case where the count value is smaller than the normal count range as recited in claim 6.

Further, Yamaguchi et al. discloses detecting the presence of air bubbles, but the detection is based on whether or not ΔT ($t_2 - t_1$) is shorter than a reference time T_0 . Yamaguchi et al. does not disclose or suggest that the ejection failure detecting means judges that an air bubble has intruded into the cavity as a cause of the ejection failure as in the case where the count value is smaller than the normal count range as recited in claim 6.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No.

2002/0018090), Fukano (Japanese Pat. No. 63141750), Ishinaga et al. (U.S. Pat. Pub. No. 2002/0149657) and further in view of Noyes et al. (U.S. Pat. No. 6,364,452) and Yamaguchi et al. (U.S. Pat. No. 5,379,061). Claim 7 also stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), Ishinaga et al. (U.S. Pat. Pub. No. 2002/0149657) and further in view of Fujii (U.S. Pat. No. 6,299,277) and Yamaguchi et al. (U.S. Pat. No. 5,379,061). These rejections are respectfully traversed.

Noyes et al. discloses that a maximum pulse width is used during those times when nozzles are more likely to experience drying or coagulating of ink, and the use of a maximum pulse width decreases the likelihood of nozzles becoming clogged. However, Noyes et al. does not disclose or teach that the ejection failure detecting means judges that the liquid in the vicinity of the nozzle has thickened due to drying or that paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the ejection failure as in the case where the count value is larger than the normal count range as recited in claim 7.

Thus, Applicant submits that neither Yamaguchi et al. nor Fujii (US '277) disclose or teach the feature of claim 7 described above.

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and further in view of Nishida et al. (U.S. Pat. Pub. No. 2003/0146742). This rejection is respectfully traversed.

Claim 8 is amended into independent form and now recites the subject matter of

former base claim 1. In rejecting former claim 8, the office action refers to paragraph [0204] of Nishida et al. (US 20030146742).

However, paragraph [0204] simply discloses that “The first time interval is set to be a time interval obtained by subtracting a quarter of the standard natural vibration period T_{cstd} from the standard time interval, while the second time interval is set to be a time interval obtained by adding a quarter of the standard natural vibration period T_{cstd} to the standard time interval. By this setting, the median between the first and second time intervals is matched with the standard time interval.” Applicant respectfully submits that this is irrelevant to the claimed invention. In particular, the objects of Nishida et al. are to make the measurement of the natural vibration period more efficient while improving the measuring accuracy of the natural vibration period, and to control the amount or the flight velocity of an ejected droplet with higher accuracy, which are not relevant to the detection of the ejection failure of the droplets which is an object of the claimed invention.

For these reasons, Applicant respectfully submits that amended claim 8 is patentable over the cited references.

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742) and further in view of Kawamura (U.S. Pat. No. 4,577,203). Claim 9 also stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat.

Pub. No. 2003/0146742) and further in view of Yamaguchi et al. (U.S. Pat. No. 5,379,061), Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742). These rejections are respectfully traversed.

Claim 9 depends from claim 8 and should be in condition for allowance for at least the same reasons as set forth above.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742) and further in view of Noyes et al. (U.S. Pat. No. 6,364,452), Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742). Claim 10 also stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742) and further in view of Fujii (U.S. Pat. No. 6,299,277), Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742). These rejections are respectfully traversed.

Claim 10 depends from claim 8 and should be in condition for allowance for at least the same reasons as set forth above.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii et al. (U.S. Pat. No. 5,975,668) in view of Takazawa et al. (U.S. Pat. Pub. No.

2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742) and Noyes et al. (U.S. Pat. No. 6,364,452) or Fujii (U.S. Pat. No. 6,299,277), and further in view of Takazawa et al. (U.S. Pat. Pub. No. 2002/0018090), Fukano (Japanese Pat. No. 63141750), and Nishida et al. (U.S. Pat. Pub. No. 2003/0146742) or Fujii (U.S. Pat. No. 6,299,277). This rejection is respectfully traversed.

Claim 11 depends from claim 8 and should be in condition for allowance for at least the same reasons as set forth above.

DOUBLE PATENTING

Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, and 40; 1 and 3; 9; 10; 11 and 12; 13 and 14; 19; 4; 13 and 14; 19; 16; 5; 42; 43; 44; 45; 46; 47; 48; and 49 respectively of copending Application No. 10/824335. Inasmuch as the claims have been amended herein, Applicant elects to defer filing a terminal disclaimer until after the Examiner considers the foregoing.

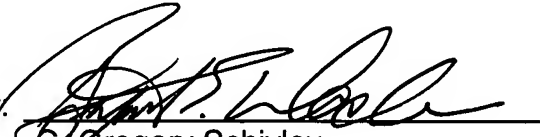
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and

favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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